Claims

What is claimed is:

1. A method comprising:
receiving signals corresponding to a first parameter; and
performing an inversion of the received signals to generate a mapping of
a second parameter;
wherein the inversion is regularized by a Duncan and Horn formulation of a Kalman filter.

2. The method of claim 1, wherein the first parameter comprises electrocardial potentials at a distance from a surface of a heart, and wherein the second parameter comprises electrocardial potentials at the surface of the heart.

3. The method of claim 2, wherein the first parameter electrocardial potentials are measured at positions within a chamber of the heart.

4. The method of claim 2, wherein the first parameter electrocardial potentials are measured at positions external to the heart.

5. The method of claim 2, wherein the first parameter electrocardial potentials are measured simultaneously by a multi-electrode probe.

6. The method of claim 5, wherein the first parameter electrical potentials are measured simultaneously by regularly spaced electrodes on the multi-electrode probe.

7. The method of claim 2, wherein the first parameter electrocardial potentials are measured using a multi-sensor probe including elements selected from the group consisting of superconductive quantum interference devices, magnetometers and electrometer amplifier based sensors.

8. The method of claim 1, wherein the Duncan and Horn formulation of the Kalman filter is based upon multiple steps in time.

9. The method of claim 8, wherein the Duncan and Horn formulation of the Kalman filter is based upon a selectable number of steps in time.

10. The method of claim 5, further comprising conditioning the inversion by performing an action selected from the group consisting of positioning the electrodes on the probe to reduce ill-conditioning of the inversion; orienting the probe to reduce ill-conditioning of the inversion; and selecting nodes on the surface of the heart to reduce ill-conditioning of the inversion.

11. A system comprising:
a data processor;
a data input interface coupled to the data processor; and
a data output interface coupled to the data processor;
wherein the processor is configured to
receive input data corresponding to a first parameter from the data input interface,
perform regularization using a Duncan and Horn formulation of a Kalman filter in generating output data corresponding to a second parameter, and
provide the output data to the data output interface.

11. The system of claim 11, wherein the first parameter comprises electrocardial potentials at a distance from a surface of a heart, and wherein the second parameter comprises electrocardial potentials at the surface of the heart, and wherein the data processor is configured to generate a mapping of the electrocardial potentials at the surface of the heart.

12. The system of claim 12, further comprising a multi-electrode probe coupled to the data input interface and configured to measure the first parameter electrocardial potentials.

13. The system of claim 13, wherein the multi-electrode probe is configured to measure the first parameter electrocardial potentials at positions within a chamber of the heart.

14. The system of claim 13, wherein the multi-electrode probe is configured to measure the first parameter electrocardial potentials at positions external to the heart.

15. The system of claim 13, wherein the multi-electrode probe includes a plurality of regularly spaced electrodes.

16. The system of claim 12, further comprising a multi-sensor probe which includes elements selected from the group consisting of superconductive quantum interference devices, magnetometers and electrometer amplifier based sensors.

17. The system of claim 11, wherein the processor is configured to regularize the generation of the output data, wherein the Duncan and Horn formulation of the Kalman filter is based upon multiple steps in time.

18. The system of claim 18, wherein the processor is configured to regularize the generation of the output data, wherein the Duncan and Horn formulation of the Kalman filter is based upon a selectable number of steps in time.

20. The system of claim 12, wherein the data processor is configured to generate the mapping of the electrocardial potentials at selected nodes on the surface of the heart, where the nodes are selected to reduce ill-conditioning of the inversion.